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G. M. HOMANS, - - - State Forester

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FOREST SERVICE, U. S. DEPT. AGRICULTURE

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# YIELD FROM EUCALYPTUS PLANTATIONS IN CALIFORNIA

BY

LOUIS MARGOLIN,  
Forest Examiner, Forest Service  
United States Department of Agriculture

1910

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# YIELD FROM EUCALYPTUS PLANTATIONS IN CALIFORNIA.

## INTRODUCTION.

The study of yield from eucalyptus plantations in California was made in coöperation between the California State Board of Forestry and the Forest Service of the United States Department of Agriculture. The field work extended over a period of two months (June 24 to August 30, 1910), during which time practically all the important eucalyptus groves of any extent within the State were visited and examined. Sample plots, usually a quarter of an acre in extent, were measured off within the groves showing the best growth. The diameter of every tree within the sample plot was carefully measured with a diameter tape, and the average height of the trees of the different diameter classes was obtained with the Forest Service hypsometer-grade-meter. Usually only one such sample plot, selected to show average conditions, was measured in each grove, but in several instances, in the larger groves, two sample plots were taken and the results averaged. The sample plots were located in the interior of each grove, and excluded the larger but shorter trees in the outside rows in order to obtain average conditions of yield in the interior of the plantations. With few exceptions no measurements were taken in groves less than an acre in extent or under three years of age.

The object of this report is to give in tabular form the results of measurements thus obtained. The figures given represent the actual yield now on the ground in the best eucalyptus groves in California.

## FACTORS INFLUENCING GROWTH.

*Soil.* While eucalyptus is greatly influenced by the quality of the soil, and under similar temperature and moisture conditions will make the best and most rapid growth on soil of good quality, care must be taken not to overestimate the effect of the quality of the soil on its rate of growth. One of the best groves in the State (the Linda Vista Grove

near Mission San Jose) is growing on a hard clayey loam with a high per cent of adobe. The chemical composition of the soil is far less important than its physical composition, because the latter determines to a large extent the amount of available soil moisture. A deep, loose, moderately fine grained, sandy loam is the best for most species of eucalyptus. It is also the best for almost all other forest trees. The amount of available soil moisture depends also on the depth of the water table. Eucalyptus, as a rule, prefers a moist soil and responds readily to irrigation on dry situations. Low, swampy land, however, is not favorable to good growth, especially if the roots of the trees are constantly flooded. The red gum (*E. rostrata*) and the swamp mahogany (*E. robusta*) are probably the least exacting in this respect, and will thrive in wet situations. The sugar gum (*E. corynocalyx*), on the other hand, is the most intolerant in this respect. Excessive irrigation in a young plantation is inadvisable, since it tends to develop a surface root system which may die when the artificial watering is stopped. Conditions most favorable for the growth of eucalyptus are a well-drained soil with a water table 8 to 12 feet deep, though trees may make good growth in places where the ground water is 30 feet or more in depth. A soil underlaid by a layer of impermeable hardpan near the surface is unfavorable for eucalyptus, since such a layer cuts off the supply of available soil moisture. A young plantation may make very good growth on such a soil until the roots reach the impenetrable layer, when the trees will remain scrubby and stunted. For this reason it is often unsafe to determine the suitability of a region to the growth of eucalyptus by judging the growth made in young plantations. A stiff clayey soil, or one containing a high per cent of adobe, is unfavorable to the growth of eucalyptus mainly because such a soil does not allow of a thorough drainage.

*Temperature.* The effect of temperature on the growth of eucalyptus is of prime importance in California, because the range of the tree is determined by its ability to endure cold more than by any other one factor.

*Precipitation.* The question of precipitation is more regional than local and will not be discussed here at length. The relative humidity of the atmosphere, the distribution of the rain throughout the year, and the occurrence of droughts are more important in determining the growth of the tree than the actual total amount of annual rainfall, and for this reason it is possible to grow eucalyptus near the coast where the trees can get the benefit of the sea fogs, when an interior valley receiving the same amount of annual rainfall may prove too dry.

*Methods of planting.* The methods employed in planting and caring for a grove have a great influence on the yield. The question of proper

spacing is of especial importance. Wide spacing favors diameter growth and wide branching, while close spacing stimulates height growth and favors the development of clear straight trunks free from branches. If trees are grown too far apart they receive too much light, branch out, and tend to become scrubby and scraggy. On the other hand, if planted too close together proper growth is interfered with, and the trees tend to become tall and spindling. Between these two extremes there is a spacing which will result in the most desirable height and form of a tree, as well as in the best diameter growth. This optimum spacing of eucalyptus varies with the species, the quality of the soil, the amount of available moisture in the ground, and the amount of precipitation. In general it may be stated that spacing on poor soil should be closer than on good soil, since the rate of growth on the former will be slower, and it is necessary to plant more trees to the acre to form a close crown cover and establish forest conditions as soon as possible. However, since there may be insufficient food and moisture for the trees on the poor soil, thinnings should be made early, so as to give the best trees a chance to develop. On the other hand spacing on good soils need not be as close, and thinnings need not be made as early. In the two groves giving the heaviest yield per acre in California, the Newark grove and the Fruitvale grove, the spacing is 6 by 6 feet. This is probably merely a coincidence, since the best growth is usually found in the case of trees growing singly or in narrow belts of from two to ten rows of trees. Much more data will have to be collected before a definite conclusion can be reached on the best spacing of eucalyptus.

*Cultivation.* There is no doubt that cultivation stimulates growth in the first few years. In a case where the water table is fairly near the surface and the atmosphere is very hot and dry, cultivation may save a plantation by keeping it alive until the roots tap the water table and the trees are able to take care of themselves. To this extent cultivation will increase the growth, and therefore the yield, in the early years of the plantation's life. It will probably affect the final yield to a small extent. The chief advantage lies in the fact that cultivation insures a more flourishing and more rapid growth for the first few years when the trees need it most.

*Methods of management.* The ultimate yield will no doubt be influenced by the number and severity of the thinnings which might be made from time to time, but as there are practically no old groves of eucalyptus in California which have been systematically thinned no definite statements can be made. This is a matter which must be worked out in practice, and any estimates at present would be mere guesses. It is safe to say, however, that the ultimate yield will be

greater and of better quality in case thinnings are intelligently made. The Webb grove near Hayward was the only managed stand of eucalyptus found in the State. Here the trees were set out in 1873-74 and spaced 8 by 8 feet. When ten years of age the grove was thinned by taking out alternate rows of trees, leaving a present stand spaced 16 by 16 feet. The grove is now thirty-six years old, averages 168 trees per acre, and shows a yield of 5,178.8 cubic feet, or 17,600 board feet per acre. This yield is exceeded by several unmanaged stands. The poor showing made by the Webb grove is probably due to the poor soil and the depth of the water table.

### YIELD.

The yield from existing groves was obtained by means of sample plots and volume tables by the following methods:

1. *Diameter of the tree.* The diameters were measured outside the bark at a point  $4\frac{1}{2}$  feet above the ground. This is known as the "breast-high diameter," and is the standard used almost universally by foresters. As has already been mentioned, the measurements were made with a diameter tape.

2. *Height of the tree.* This refers to the total height of the tree from the ground to the topmost point in the crown. It was obtained by means of an instrument known as the hypsometer-gradometer.

3. *Number of trees per acre.* All trees  $1\frac{1}{2}$  inches or more in diameter were measured. When a tree forks at a point less than  $4\frac{1}{2}$  feet above the ground, each fork was measured as a separate tree; when the tree forks at a point higher than  $4\frac{1}{2}$  feet above the ground, it was measured as a single individual. Eucalyptus trees, when grown in an open stand, are apt to fork close to the ground. Many trees when injured send out numerous shoots or suckers, some of which develop into merchantable size. It often happens, therefore, that the number of trees per acre when a plantation is five years or more of age is greater than the number originally planted, in spite of the fact that many trees may have been crowded out and killed in the natural struggle for existence.

4. *The volume table.* After the diameter and the height of a tree were ascertained, its volume was obtained by means of tables which show the average volume or contents of trees of various sizes. Two of the same species having the same diameter and the same height give practically the same volume wherever grown and whatever system of management is used, provided they are approximately of the same age.

Table I shows the average volume in cubic feet of different sized blue gum trees.

TABLE I. Volume Table for Blue Gum (*Eucalyptus globulus*). Seedlings and Sprouts.

Diameter breast- high.	Total height—Feet.											Basis.
	40	50	60	70	80	90	100	110	120	130	140	
Inches.	Volume of used length with bark—Cubic feet.											Trees.
5	2.3	2.7	3.2	3.7	4.5	5.6	8.8					197
6	3.0	3.6	4.4	5.4	6.4	7.6	11.3					200
7	3.8	4.7	5.7	7.2	8.4	9.7	14.6					201
8	4.8	6.0	7.3	8.9	10.5	12.0	17.0					171
9	5.8	7.3	8.9	10.8	12.7	14.6	20.2		21.3			120
10		8.8	10.7	12.8	15.0	17.4	23.7		25.8	8		72
11		10.4	12.5	14.9	17.5	20.5	27.4		30.5	33.7		41
12					20.2	23.7	31.4		35.2	39.2		27
13					22.9	27.2	35.4		40.0	44.8	50.5	20
14							35.6	40.0	45.1	50.6	56.6	7
15									50.2	56.3	63.0	4
16									55.5	62.2	69.4	5
17									61.1	68.3	75.9	3
18									66.8	74.2	82.5	2
19									72.5	80.3	89.2	1
20									78.4	86.6	96.3	2
												1,073

To construct the above table several thousand felled trees were measured in 1903 and the diameter taken at intervals of 10 feet along the stem of the tree. Of the trees measured 1,073 of the largest were selected, the volume of each one was computed and the resulting data plotted on cross-section paper. Curves were then drawn and the averages read from the curves. The volume of the stump, which was 6 to 12 inches high, and of the top above a point where the diameter inside the bark was less than 2 inches, were not included. The data were worked over recently for the purposes of this circular, and errors appearing in former tables based on them have been corrected.\*

To convert the volume of a tree in cubic feet to its equivalent in standard cords it was assumed that on the average 90 cubic feet of solid wood will equal one standard cord of 128 cubic feet. The California cord contains three fourths of the volume of a standard cord.

\*The lefthand vertical column in the above table shows the diameter of the tree at breast height; the upper horizontal line shows the total height of the tree from the ground to the top of the crown. To find the volume of a tree of any diameter and height, for example, 10 inches in diameter and 100 feet high, look in the lefthand column for the diameter (10) and under the height (100) find the volume (20.2 cubic feet).

Table II shows the average volume in board feet of different sized blue gum, as scaled by the Scribner decimal rule.

**TABLE II. Volume Table for Blue Gum (*Eucalyptus globulus*). Seedlings and Sprouts.**

Diameter breast-high.	Total height--Feet.										Basis.
	50	60	70	80	90	100	110	120	130	140	
<i>Inches.</i>	<i>Volume, scaled by Scribner rule-board feet.</i>										<i>Trees.</i>
7 -----	5	5	10	10	10	15	20	-----	-----	-----	198
8 -----	10	10	15	20	25	30	35	-----	-----	-----	171
9 -----	15	20	20	30	35	40	50	60	-----	-----	119
10 -----	20	25	30	40	45	55	70	80	95	-----	72
11 -----	25	30	40	50	60	70	85	100	115	-----	41
12 -----	-----	-----	-----	60	75	90	105	120	140	-----	27
13 -----	-----	-----	-----	70	85	105	125	145	170	205	20
14 -----	-----	-----	-----	-----	-----	-----	145	170	195	230	7
15 -----	-----	-----	-----	-----	-----	-----	-----	195	225	260	4
16 -----	-----	-----	-----	-----	-----	-----	-----	220	250	290	5
17 -----	-----	-----	-----	-----	-----	-----	-----	245	280	315	3
18 -----	-----	-----	-----	-----	-----	-----	-----	270	305	345	2
19 -----	-----	-----	-----	-----	-----	-----	-----	290	330	370	1
20 -----	-----	-----	-----	-----	-----	-----	-----	315	360	405	2
											672

The above table is based on the measurements of 672 felled trees. The diameter inside the bark was measured every 10 feet along the stem, and the scale was obtained by referring to a Scribner decimal log rule. All logs having a diameter of 5.5 inches or more inside the bark at the small end were scaled. Logs smaller than 5.5 inches in diameter inside the bark were considered too small to scale for lumber.

The Scribner decimal log rule was used because it is the fairest rule in common use for scaling small logs, as may be seen from the following table:

**TABLE III. Comparison of Log Rules for Board Measure.**

*Twelve-foot logs.*

Name of rule.	Diameter in inches.							
	6	8	10	12	14	16	18	20
	<i>Board feet.</i>							
Scribner -----	14	23	38	59	86	119	160	210
Doyle -----	3	12	27	48	75	108	147	192
Doyle and Scribner -----	3	12	27	48	75	108	147	192
Spaulding -----	-----	-----	38	58	86	121	162	207

While the Spaulding rule is the legal rule in California, it was intended primarily for scaling conifers, and gives no values for logs less than 10 inches in diameter.

The Doyle rule is in common use and is more generally employed than any other rule. It is very unfair to small logs, as may be seen from the above table.

The Doyle and Scribner rule is a combination of the two rules after which it is named, and combines the unfairness of both. For diameters less than 28 inches it is identical with the Doyle rule, and for diameters of 28 inches or over it is the same as the Scribner rule.

The following description of the Scribner rule is taken from page 32 of "The Woodsman's Handbook," Bulletin 36 of the Forest Service:

**THE SCRIBNER RULE.**—This is the oldest log scale now in general use. . . . The rule was based on computations derived from diagrams drawn to show the number of inch boards that can be sawed from logs of different sizes after allowing for waste. The contents of these boards were then calculated and the table built up in this way. Sometimes the Scribner rule is converted into what is known as the Scribner decimal rule by dropping the units and rounding the values to the nearest tens.

Table II, showing the volume of trees expressed in board feet, does not include the volume of the tops too small to scale as lumber. This is given in Table IV, which shows the volume of the part of the tree between points where it is 5.5 inches and 2.0 inches in diameter inside the bark.

**TABLE IV. Volume of Merchantable Tops. Blue Gum (*Eucalyptus globulus*). Seedlings and Sprouts.**

Diameter breast-high.	Total height—Feet.										Basis.
	50	60	70	80	90	100	110	120	130	140	
Inches.	Volume—Cubic feet.										Trees.
7	3.8	4.4	4.9	5.5	6.0	6.5	7.1	-----	-----	-----	198
8	3.3	3.9	4.5	5.0	5.6	6.1	6.6	-----	-----	-----	171
9	2.8	3.5	4.0	4.6	5.1	5.6	6.2	6.7	-----	-----	119
10	2.3	3.0	3.6	4.1	4.7	5.2	5.7	6.3	6.8	-----	72
11	1.7	2.5	3.1	3.7	4.3	4.8	5.3	5.8	6.3	-----	41
12	-----	-----	-----	3.2	3.9	4.3	4.8	5.3	5.8	-----	27
13	-----	-----	-----	2.8	3.4	3.9	4.4	4.8	5.3	5.5	20
14	-----	-----	-----	-----	-----	-----	4.0	4.4	4.8	5.0	7
15	-----	-----	-----	-----	-----	-----	-----	3.9	4.3	4.5	4
16	-----	-----	-----	-----	-----	-----	-----	3.5	3.8	4.0	5
17	-----	-----	-----	-----	-----	-----	-----	3.0	3.3	3.5	3
18	-----	-----	-----	-----	-----	-----	-----	2.4	2.8	3.0	2
19	-----	-----	-----	-----	-----	-----	-----	1.9	2.3	2.5	1
20	-----	-----	-----	-----	-----	-----	-----	1.4	1.7	2.0	2
											672

Detailed descriptions and yield tables of individual groves are given in the following pages:

TABLE V. Summary of Yield from Blue Gum Plantations.

Seedling growth.

Name of grove.	Location.		Age.	Original spacing.	Present number of trees per acre.	Biggest est. diam-eter.	Great-est height.	Yield per acre.				Soil, water table, etc.
	Town.	County.						Total.	Total.	Unmer-chant-able tops.		
			Years.	Feet.	Trees.	Inches.	Feet.	Cubic ft.	Cal. cds.*	Bd. ft.*	Cal. cds.*	
Pratt Bros.	Escondido	San Diego	1½	8 x 8	636	3	25					Fine decomposed granite. Water table, 8 to 20 feet.
Wheeler	Callender	San Luis Ob'po	3½	10 x10	328	6	40	196.0				Loose sand. Water table, 100 feet.
Ontario	West Ontario	San Bernar'o	5	8 x 8	616	6	50	572.8				Sedimentary soil. Water table, 130 feet. Irrigated.
Thompson	Garden Grove.	Orange	5	9 x 9	616	7	70	1,948.8	28.9	280	27.9	Loose loamy sand. Water table, 20 feet. Irrigated.
Jackson Park	Zaferia.	Los Angeles	6	8 x 8	684	8	60	1,695.2	25.1	240	24.1	Light sandy loam. Hard-pan. Water table, 17 feet.
Porter	Summerland.	Santa Barbara	7	8 x 8	496	7	50	1,035.6	15.3	60	15.2	Sandy loam. Water table, 75 feet.
Sexton	Watts.	Los Angeles	7	8 x 8	340	10	70	1,510.4	22.4	1,600	15.1	Hard sandy loam. Water table, 12 to 15 feet.
Diam'd Coal Co.	Watts.	Los Angeles	7	8 x 8	560	10	90	2,245.4	33.2	2,370	24.1	Stiff sandy loam. Hardpan. Water table, 15 feet.
Hunter	Bairdstown	Los Angeles	8	6 x 8	844	8	80	2,947.6	43.6	1,280	39.2	Sandy loam. Water table, 12 feet.
Knapp	Garden Grove.	Orange.	8	6 x 8	888	8	70	2,354.0	34.9	1,160	30.7	Stiff sandy loam. Water table, 10 to 12 feet.
Courreges	Talbert	Los Angeles	8	6½ x 6½	728	10	80	3,322.0	49.2	5,160	28.5	Fine silt, mixed with loam. Water table at surface.
Meechan (Fritsch)	Live Oaks	Sonoma.	9	12 x12	344	12	110	5,334.4	79.0	13,100	27.7	Fine light sand. Water table, 10 to 15 feet.
Gordon	Straw'b'ry Park	Los Angeles	10	10 x10	430	10	80	1,410.8	20.9	1,620	14.5	Sandy loam, mixed with clay. Hardpan. Water table, 80 feet.
Howland	Sunnyside	Los Angeles	10-12	8 x 8	660	7	70	1,044.8	15.2	80	15.5	Hard sandy loam. Hard-pan. Water table, 20 feet.

Meehan (Pritsen)	Live Oaks	Sonoma	12	12 x 12	336	12	120	5,939.6	88.0	16,660	25.7	Fine light sand, table, 10 to 15 feet.	Water
Clark	San Mateo	San Mateo	15	6 x 6	632	12	100	5,468.8	81.0	10,400	38.7	Stiff loamy clay.	Water
Windermere.	La Mirada	Los Angeles	16	8 x 8	528	12	120	7,065.6	104.7	17,920	36.3	Light sandy loam.	Water
Meehan (Long Belt)	Live Oaks	Sonoma	22	10 x 10	596	22	120	12,672.0	187.7	37,800	46.6	Deep, fine grained loamy sand. Water table, 20 to 25 feet.	Water
Fruitvale	Fruitvale	Alameda	25	6 x 6	776	18	150	16,894.8	247.9	54,200	57.8	Heavy loamy clay with adobe. Water table, 20 to 25 feet.	Water
Meehan (Stony Pt.)	Stony Point	Sonoma	30	8 x 8	724	16	130	10,491.2	155.4	27,920	53.5	Sedimentary soil.	Water
Meehan (Faught)	Stony Point	Sonoma	30	8 x 8	732	15	130	10,671.2	158.1	25,000	63.9	Fine loamy sand.	Water
Meehan (Shrop- shire)	Live Oaks	Sonoma	30	9 x 9	516	12	100	4,974.8	73.7	9,320	35.5	Fine sand mixed with clay.	Water table, 30 to 35 feet.
Meehan (Ellis)	Live Oaks	Sonoma	30	10 x 10	684	16	110	8,701.6	128.9	21,010	44.1	Fine light sand with clay.	Water table, 15 to 20 feet.
McDonald	El Cajon	San Diego	30	10 x 10	300	15	120	4,056.4	60.1	10,160	19.9	Fine loose loamy sand.	Water table, 12 to 15 feet.
Therefall	Newark	Alameda	32	6 x 6	540	20	170	15,836.4	234.6	57,820	41.2	Adobe loam.	Water table, 14 to 15 feet.
Jewett	Elmira	Solano	35	10 x 10	344	22	130	10,877.2	153.7	36,020	21.9	Fertile clayey loam.	Water table, 25 to 30 feet.
Webb	Hayward	Alameda	36	8 x 8	168	19	110	5,178.8	76.7	17,600	10.9	Hard adobe clay.	Water table, 40 feet.
Linda Vista	Mission San Jose	Alameda	40	8 x 8	612	18	150	15,139.6	224.3	50,620	50.0	Hard clay loam with adobe.	Water table, quite deep.

\* A California cord is equal to  $\frac{1}{2}$  of a Standard cord.

† The total expressed in board feet is not in addition to the total stated in cubic feet and in cords, but is another way of expressing the same total.

## YIELD FROM EUCALYPTUS

TABLE V. Summary of Yield from Blue Gum Plantations.—Continued.  
*Sprout growth.*

Name of grove.	Location.		Age	Original spacing	Present number of trees per acre.	Biggest diameter.	Great-est height.	Yield per acre.				Soil, water table, etc.
	Town.	County.						Total.	Total.	Unmer-chant-able. tops.		
			Years.	Feet.	Trees.	Inches.	Feet.	Cubic ft.	Cal. cds.*	Bd. ft.†	Cal. cds.*	
Glass	Watts	Los Angeles	8	8 x 8	1,064	11	90	3,888.8	57.6	5,740	34.2	Stiff sandy loam. Water table, 15 to 25 feet.
Montague	Watts	Los Angeles	8-9	8 x 10	928	10	90	3,530.0	52.3	4,080	35.5	Stiff heavy loamy sand. Water table, 12 feet.
Thaxter	Nadeau	Los Angeles	11-13	8 x 8	1,024	10	80	1,642.8	24.3	1,240	19.5	Light loamy sand. Water table, 16 to 30 feet.
Thaxter	Nadeau	Los Angeles	13-20	10 x 10	608	12	130	4,964.8	73.5	10,320	34.7	Light loamy sand. Water table, 30 to 35 feet.

\* A California cord is equal to  $\frac{3}{4}$  of a standard cord.

† The total expressed in board feet is not in addition to the total stated in cubic feet and in cords, but is another way of expressing the same total.

**WHEELER GROVE.**

Located near Callender, San Luis Obispo County.

Species ----- Blue gum. Seedlings.  
 Age -----  $3\frac{1}{2}$  years.  
 Elevation ----- 200 to 300 feet.  
 Soil ----- A drifting, loose, light sand. Top of hill, with a general southeast slope.  
 Water table ----- About 100 feet deep.  
 Area of grove ----- 5 acres.  
 Spacing ----- 10 by 10 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. In a long strip. Young wild seedlings were used, which were picked from under a windbreak of trees. Beans were grown between the young plants the first year. The plantation was cultivated for the first two years.

Information in regard to age and management of this grove obtained from Mr. T. P. Lukens.

**YIELD.**

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>
2 -----	20	20	-----
3 -----	30	88	-----
4 -----	40	136	-----
5 -----	40	80	184.0
6 -----	40	4	12.0
Totals -----	-----	328	196.0

**SUMMARY.**

Age,  $3\frac{1}{2}$  years. Seedlings.  
 Volume per acre, 196.0 cubic feet, which is equal to 2.2 standard cords, or 2.9 California cords.

**ONTARIO GROVE.**

Located near Dr. Turner's Orange Grove, West Ontario, San Bernardino County.

Species ----- Blue gum. Seedlings.  
 Age ----- 5 years.  
 Elevation ----- About 800 feet.  
 Soil ----- Light, fine grained, sedimentary soil, mixed with gravel.  
 Water table ----- 130 feet deep.  
 Area of grove ----- About 5 acres.  
 Spacing ----- 8 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet. This grove was cultivated several times, and partly irrigated the first three years.

Information in regard to age of the grove and cultivation obtained from adjoining neighbor, who has lived there for a number of years.

**YIELD.**

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>
2 -----	30	66	-----
3 -----	40	96	-----
4 -----	40	220	-----
5 -----	40	224	515.2
6 -----	50	16	57.6
Totals -----	-----	616	572.8

## SUMMARY.

Age, 5 years. Seedlings.  
 Volume per acre, 572.8 cubic feet, which is equal to 6.4 standard cords, or 8.5 California cords.

## THOMPSON GROVE.

Located at Garden Grove about 1 mile from Railroad Station, Los Angeles County.

Species ----- Blue gum. Seedlings.  
 Age ----- 5 years.  
 Elevation ----- About 100 feet.  
 Soil ----- A very light, loose, loamy sand.  
 Water table ----- About 20 feet deep.  
 Spacing ----- 9 by 9 feet.

The land was irrigated for three years. The soil is very sandy and porous and will not hold water. This grove is part of a 60-acre plantation belonging to several owners.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to age of the grove obtained from Mr. Mickle, who helped plant and irrigate this grove.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2 -----	30	16	-----	-----	-----
3 -----	40	64	-----	-----	-----
4 -----	50	64	-----	-----	-----
5 -----	60	172	550.4	-----	550.4
6 -----	60	272	1,198.8	-----	1,198.8
7 -----	70	28	201.6	280	137.2
Totals -----	-----	616	1,948.8	280	1,884.4

## SUMMARY.

Age, 5 years. Seedlings.  
 Volume per acre, 1,948.8 cubic feet, which is equal to 21.7 standard cords, or 28.9 California cords.  
 Volume per acre, 280 board feet.\*  
 Volume of merchantable tops, including the trees too small to scale, per acre, 1,884.4 cubic feet, equal to 20.9 standard cords, or 27.9 California cords.

## JACKSON PARK GROVE.

Located near Zaferia on the Pacific Electric car line from Los Angeles.

Species ----- Blue gum. Seedlings.  
 Age ----- 6 years.  
 Elevation ----- About 100 feet.  
 Soil ----- Light sandy loam, with layer of hardpan about 2 or 3 feet below the surface.  
 Water table ----- About 17 feet.  
 Area of grove ----- About 5 acres.  
 Spacing ----- 8 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to the age of the grove obtained from one of the neighbors.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2 -----	40	72	-----	-----	-----
3 -----	50	80	-----	-----	-----
4 -----	50	96	-----	-----	-----
5 -----	60	240	768.0	-----	768.0
6 -----	60	156	686.4	-----	686.4
7 -----	60	32	182.4	160	140.8
8 -----	60	8	58.4	80	31.2
Totals -----	-----	684	1,695.2	240	1,626.4

## SUMMARY.

Age, 6 years. Seedlings.

Volume per acre, 1,695.2 cubic feet, which is equal to 18.8 standard cords, or 25.1 California cords.

Volume per acre, 240 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,626.4 cubic feet, equal to 18.1 standard cords, or 24.1 California cords.

## PORTER GROVE.

Located on the hills between Santa Barbara and Summerland, Santa Barbara County.

Species ----- Blue gum. Seedlings.

Age ----- 7 years.

Elevation ----- About 300 feet. The grove is on a gentle southeast slope.

Soil ----- A deep, fine-grained, sandy loam.

Water table ----- 75 feet, or more, deep.

Area of grove ----- 6 acres.

Spacing ----- 8 by 8 feet.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet. The land was cultivated and watered for the first three or four years.

Information in regard to age and management of this grove obtained from a forest ranger who lives nearby.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2 -----	30	24	-----	-----	-----
3 -----	30	36	-----	-----	-----
4 -----	40	116	-----	-----	-----
5 -----	50	144	388.8	-----	388.8
6 -----	50	164	590.4	-----	590.4
7 -----	50	12	58.4	60	45.6
Totals -----	-----	496	1,035.6	60	1,024.8

## SUMMARY.

Age, 7 years. Seedlings.

Volume per acre, 1,035.6 cubic feet, which is equal to 11.5 standard cords, or 15.3 California cords.

Volume per acre, 60 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,024.8 cubic feet, equal to 11.4 standard cords, or 15.2 California cords.

\*The volume given in board feet is *not in addition* to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## SEXTON GROVE.

Located on Central avenue, between Watts and Compton, Los Angeles County.

Species ----- Blue gum. Seedlings.  
 Age ----- 7 years.  
 Elevation ----- About 100 feet.  
 Soil ----- Very hard sandy loam.  
 Water table ----- 12 to 15 feet deep.  
 Spacing ----- 8 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to age of the grove obtained from Mr. Brinkerhoff, who lives near the plantation.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	40	28	-----	-----	-----
3 -----	50	24	-----	-----	-----
4 -----	50	36	-----	-----	-----
5 -----	60	60	192.0	-----	192.0
6 -----	60	60	264.0	-----	264.0
7 -----	60	64	364.8	320	281.6
8 -----	70	32	284.8	480	144.0
9 -----	70	28	302.4	560	112.0
10 -----	70	8	102.4	240	28.8
Totals -----	-----	340	1,510.4	1,600	1,022.4

## SUMMARY.

Age, 7 years.

Volume per acre, 1,510.4 cubic feet, which is equal to 16.8 standard cords, or 22.4 California cords.

Volume per acre, 1,600 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,022.4 cubic feet, equal to 11.4 standard cords, or 15.1 California cords.

## DIAMOND COAL CO. GROVE.

Located on Central avenue, between Watts and Compton, Los Angeles County.

Species ----- Blue gum. Seedlings.  
 Age ----- 7 years. Planted in the winter of 1902-3. One half of the area is cut and the other half is intact. The sample plot was taken in the uncut portion.  
 Elevation ----- About 100 feet.  
 Soil ----- Stiff, sandy loam. Probably underlaid with hardpan.  
 Water table ----- About 15 feet.  
 Area of grove ----- About 30 acres.  
 Spacing ----- 8 by 8 feet.  
 Sample plot ----- Two areas of one quarter acre each.

Information in regard to age of the grove obtained from Mr. Brinkerhoff and Mr. Breckenridge, who live nearby.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2	30	74			
3	40	46			
4	60	78			
5	60	116	371.2		371.2
6	70	102	550.8		550.8
7	70	72	518.4	720	352.8
8	80	54	567.0	1,080	270.0
9	80	16	203.2	480	73.6
10	90	2	34.8	90	9.4
Totals		560	2,245.4	2,370	1,627.8

## SUMMARY.

4  
5  
6  
7  
8  
Tots are, 2,245.4 cubic feet, which is equal to 24.9 standard cords, or 33.2  
Tots are, 2,370 board feet.\*  
Tots are, 1,627.8 cubic feet, equal to 18.1 standard cords, or 24.1 California cords.

Age, 8 years.  
Volume per acre, 2,245.4 cubic feet.  
California cords, 24.9.  
Volume per acre, 2,370 board feet.  
Volume per acre, 1,627.8 cubic feet.  
2,072.0 cubic feet.  
Blue gum. Seedlings.  
8 years.  
About 300 feet.  
Sandy loam.  
About 12 feet deep.  
6 by 8 feet.  
1/4 acre. 135 by 81 feet.

## HUNTER GROVE.

Located at Bairdstown, Los Angeles County.

Located near Bairdstown, in regard to age of the grove obtained from neighbors residing near grove, cultivated

## YIELD.

Species	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Age	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
Elevation	40	12			
Soil	50	32			
Water table	60	192			
Area of grove	70	340	1,258.0		
Spacing	70	148	799.2		
Sample plot	70	112	806.4	1,120	
	80	8	84.0	160	
		844	2,947.6	1,280	

\*The volume given in board feet and in cords, but

## SUMMARY.

s. Seedlings.  
per acre, 2,947.6 cubic feet, which is equal to 32.7 standard cords.  
per acre, 1,280 board feet.\*  
of merchantable tops, including the trees too small to scale, per acre, 1,866.4 cubic feet, equal to 29.4 standard cords, or 39.2 California cords.  
Total volume in cubic feet

\*The volume given in board feet is not in addition to the volume stated in cords, but is simply another way of expressing the same total.

## YIELD FROM EUCALYPTUS

## KNAPP GROVE.

Located at Garden Grove, about half a mile east of Railroad Station, Los Angeles County.

Species ----- Blue gum. Seedlings.  
 Age ----- 8 years.  
 Elevation ----- About 100 feet.  
 Soil ----- A rather stiff, sandy loam. The adjoining land is cultivated for garden truck.  
 Water table ----- Surface water 10 to 14 feet deep.  
 Area of grove ----- About 3 acres.  
 Spacing ----- 6 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet. This grove will probably be cut within a year and the land used for truck farming.

Information in regard to age of grove obtained from Mr. Knapp, the present owner.

## YIELD.

Diameter Breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	40	124	-----	-----	-----
3 -----	50	164	-----	-----	-----
5 -----	60	156	-----	-----	-----
10 -----	70	156	577.2	-----	577.2
	70	180	972.0	-----	972.0
	70	92	662.4	920	450.8
Totals -----	70	16	142.4	240	72.0
		888	2,354.0	1,160	2,072.0

Age, 7 years.  
 Volume per acre -----  
 California cords. Seedlings.  
 Volume per acre, 2,354.0 cubic feet, which is equal to 26.2 standard cords, or 34.9  
 Volume of tops -----  
 1,022.4 cubic feet. \*  
 per acre, 1,160 board feet.\*  
 of merchantable tops, including the trees too small to scale, per acre,  
 feet, equal to 23.0 standard cords, or 30.7 California cords.

Located

## COURREGES GROVE.

Species -----  
 Age ----- near Talbert, R. F. D. No. 1, Huntington Beach, Los Angeles County.  
 ----- Blue gum. Seedlings.  
 ----- 8 years.  
 Elevation ----- About 100 feet.  
 Soil ----- Fine sedimentary silt, mixed with loam.  
 Water table ----- Right at the surface. Well layer 75 to 100 feet deep.  
 Area of grove ----- A little over 1 acre.  
 Spacing -----  $6\frac{1}{2}$  by  $6\frac{1}{2}$  feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 109 by 100 feet. This grove was cultivated and weeded the first year. The seedlings were bought in the nursery and were planted when the trees were about 6 inches high.

Information in  
 Breckenridge, who

\*The volume in regard to age of the grove obtained from Mr. Courreges, the owner.  
 and in cords, but

even in board feet is not in addition to the volume stated in cubic feet  
 is simply another way of expressing the same total.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	50	88			
3 -----	50	140			
4 -----	60	72			
5 -----	60	80	256.0		256.0
6 -----	70	84	453.6		453.6
7 -----	70	80	576.0	800	392.0
8 -----	70	96	854.4	1,440	432.0
9 -----	80	60	762.0	1,800	276.0
10 -----	80	28	420.0	1,120	114.8
Totals -----		728	3,322.0	5,160	1,924.4

## SUMMARY.

Age, 8 years. Seedlings.

Volume per acre, 3,322.0 cubic feet, which is equal to 36.9 standard cords, or 49.2 California cords.

Volume per acre, 5,160 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,924.4 cubic feet, equal to 21.4 standard cords, or 28.5 California cords.

## MEECHAN GROVE — FRITSCH FIELD.

Located at Live Oaks, Sonoma County.

Species ----- Blue gum. Seedlings.

Age ----- 9 years.

Elevation ----- About 50 feet.

Soil ----- Fine grained, very light sand.

Water table ----- 10 to 15 feet deep.

Area of entire grove ----- About 20 acres.

Spacing ----- 12 by 12 feet. Staggered.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet. The grove was cultivated the first year.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	30	4			
3 -----	40	4			
4 -----	40	8			
5 -----	70	16	59.2		59.2
6 -----	80	24	153.6		153.6
7 -----	90	40	388.0	400	240.0
8 -----	100	68	952.0	2,040	414.8
9 -----	100	88	1,496.0	3,520	492.8
10 -----	110	56	1,288.0	3,920	319.2
11 -----	110	28	750.4	2,380	148.4
12 -----	110	8	247.2	840	38.4
Totals -----		344	5,334.4	13,100	1,866.4

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

TABLE V. Summary of Yield from Blue Gum Plantations.

Seedling growth.

Name of grove.	Location.		Age.	Original spacing.	Present number of trees per acre.	Biggest diameter.	Greatest height.	Yield per acre.				Soil, water table, etc.
	Town.	County.						Total.	Total.	Unmerchantable tops.		
			Years.	Feet.	Trees.	Inches.	Feet.	Cubic ft.	Cal. cts.*	Bd. ft.†	Cal. cts.*	
Pratt Bros. . . . .	Escondido . . . . .	San Diego . . . . .	1½	8 x 8	636	3	25	---	---	---	---	Fine decomposed granite. Water table, 6 to 20 feet.
Wheeler . . . . .	Callender . . . . .	San Luis Ob'po . . . . .	3½	10 x10	328	6	40	196.0	---	---	---	Loose sand. Water table, 100 feet.
Ontario . . . . .	West Ontario . . . . .	San Bernar'o . . . . .	5	8 x 8	616	6	50	572.8	---	---	---	Sedimentary soil. Water table, 130 feet. Irrigated.
Thompson . . . . .	Garden Grove. . . . .	Orange . . . . .	5	9 x 9	616	7	70	1,948.8	28.9	280	27.9	Loose loamy sand. Water table, 20 feet. Irrigated.
Jackson Park . . . . .	Zaferia. . . . .	Los Angeles . . . . .	6	8 x 8	684	8	60	1,695.2	25.1	240	24.1	Light sandy loam. Hardpan. Water table, 17 feet.
Porter . . . . .	Summerland . . . . .	Santa Barbara . . . . .	7	8 x 8	496	7	50	1,035.6	15.3	60	15.2	Sandy loam. Water table, 75 feet.
Sexton . . . . .	Watts . . . . .	Los Angeles . . . . .	7	8 x 8	340	10	70	1,510.4	22.4	1,600	15.1	Hard sandy loam. Water table, 12 to 15 feet.
Diam'd Coal Co. . . . .	Watts . . . . .	Los Angeles . . . . .	7	8 x 8	560	10	90	2,245.4	33.2	2,370	24.1	Stiff sandy loam. Hardpan. Water table, 15 feet.
Hunter . . . . .	Bairdstown . . . . .	Los Angeles . . . . .	8	6 x 8	844	8	80	2,947.6	43.6	1,280	39.2	Sandy loam. Water table, 12 feet.
Knapp . . . . .	Garden Grove. . . . .	Orange. . . . .	8	6 x 8	888	8	70	2,354.0	34.9	1,160	30.7	Stiff sandy loam. Water table, 10 to 12 feet.
Courreges . . . . .	Talbert . . . . .	Los Angeles . . . . .	8	6½ x 6½	728	10	80	3,322.0	49.2	5,160	28.5	Fine silt, mixed with loam. Water table at surface.
Meehan (Fritsch) . . . . .	Live Oaks . . . . .	Sonoma. . . . .	9	12 x12	344	12	110	5,834.4	79.0	13,100	27.7	Fine light sand. Water table, 10 to 15 feet.
Gordon . . . . .	Straw'b'ry Park . . . . .	Los Angeles . . . . .	10	10 x10	430	10	80	1,410.8	20.9	1,620	14.5	Sandy loam, mixed with clay. Hardpan. Water table, 80 feet.
Howland . . . . .	Sunnyside . . . . .	Los Angeles . . . . .	10-12	8 x 8	660	7	70	1,044.8	15.2	80	15.5	Hard sandy loam. Hardpan. Water table, 20 feet.

Meechan (Frisch)	Live Oaks	Sonoma	12	12 x 12	336	12	120	5,989.6	88.0	16,660	25.7	Fine light sand. table, 10 to 15 feet.	Water
Clark	San Mateo	San Mateo	15	6 x 6	632	12	100	5,468.8	81.0	10,400	38.7	Stiff loamy clay.	Water
Windermere	La Mirada	Los Angeles	16	8 x 8	528	12	120	7,065.6	104.7	17,920	36.3	Light sandy loam. table, 10 feet.	Water
Meechan (Long Belt)	Live Oaks	Sonoma	22	10 x 10	596	22	120	12,672.0	187.7	37,900	46.6	Deep, fine grained loamy sand. Water table, 20 to 25 feet.	Water
Fruitvale	Fruitvale	Alameda	25	6 x 6	776	18	160	16,694.8	247.9	54,200	57.8	Heavy loamy clay with adobe. Water table, 20 to 25 feet.	Water
Meechan (Stony Pt.)	Stony Point	Sonoma	30	8 x 8	724	16	130	10,491.2	156.4	27,920	53.5	Sedimentary soil. table, 10 to 20 feet.	Water
Meechan (Faught)	Stony Point	Sonoma	30	8 x 8	732	15	130	10,671.2	158.1	25,000	63.9	Fine loamy sand. table, 50 feet.	Water
Meechan (Shrop- shire)	Live Oaks	Sonoma	30	9 x 9	516	12	100	4,974.8	73.7	9,320	35.5	Fine sand mixed with clay. Water table, 30 to 35 feet.	Water
Meechan (Ellis)	Live Oaks	Sonoma	30	10 x 10	684	16	110	8,701.6	128.9	21,010	44.1	Fine light sand with clay. Water table, 15 to 20 feet.	Water
McDonald	El Cajon	San Diego	30	10 x 10	900	15	120	4,056.4	60.1	10,160	19.9	Fine loose loamy sand. Water table, 12 to 15 feet.	Water
Therefall	Newark	Alameda	32	6 x 6	540	20	170	15,836.4	234.6	67,820	41.2	Adobe loam. Water table, 14 to 15 feet.	Water
Jewett	Elmira	Solano	35	10 x 10	344	22	130	10,877.2	153.7	36,020	21.9	Fertile clayey loam. table, 25 to 30 feet.	Water
Webb	Hayward	Alameda	36	8 x 8	168	19	110	5,178.8	76.7	17,600	10.9	Hard adobe clay. table, 40 feet.	Water
Linda Vista	Mission San Jose	Alameda	40	8 x 8	612	18	150	15,139.6	224.3	50,620	50.0	Hard clay loam with adobe. Water table, quite deep.	Water

\*A California cord is equal to  $\frac{1}{2}$  of a Standard cord.

†The total expressed in board feet is not in addition to the total stated in cubic feet and in cords, but is another way of expressing the same total.

## YIELD FROM EUCALYPTUS

## CLARK GROVE.

Located about a quarter of a mile south of St. Matthews School, San Mateo Park, San Mateo County.

Species ----- Blue gum. Seedlings.  
 Age ----- About 15 years.  
 Elevation ----- About 200 feet.  
 Soil ----- A stiff, loamy clay.  
 Water table ----- About 25 feet deep.  
 Area of grove ----- About 2 acres.  
 Spacing ----- 6 by 6 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 109 by 100 feet.

Information in regard to age of this grove obtained from several old residents in San Mateo.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2 -----	30	8	-----	-----	-----
3 -----	40	60	-----	-----	-----
4 -----	50	48	-----	-----	-----
5 -----	60	88	281.6	-----	281.6
6 -----	70	100	540.0	-----	540.0
7 -----	90	88	853.6	880	528.0
8 -----	90	96	1,152.0	2,400	537.6
9 -----	90	76	1,109.6	2,660	387.6
10 -----	100	36	727.2	1,980	187.2
11 -----	100	20	474.0	1,400	96.0
12 -----	100	12	328.8	1,080	51.6
Totals -----	-----	632	5,466.8	10,400	2,609.6

## SUMMARY.

Age, about 15 years. Seedlings.

Volume per acre, 5,466.8 cubic feet, which is equal to 60.7 standard cords, or 81.0 California cords.

Volume per acre, 10,400 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,609.6 cubic feet, equal to 29.0 standard cords, or 38.7 California cords.

## MEECHAN GROVE—LONG BELT.

Located at Live Oaks, Sonoma County.

Species ----- Blue gum. Seedlings.  
 Age ----- 22 years.  
 Elevation ----- About 100 feet. The sample plot was taken in the sag of a hill with a general, gentle, north slope.  
 Soil ----- A deep, very fine grained, loamy sand, with a small amount of clay.  
 Water table ----- 20 to 25 feet deep.  
 Area of grove ----- A long belt, 7 rows (62 feet) wide, and  $1\frac{1}{2}$  miles long.  
 Spacing ----- 10 by 10 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 60 by 180 feet. All trees were taken, those on the outside as well as those on the inside rows. This sample plot represents the best portion of the grove. The grove was cultivated the first year.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
3	40	8			
4	50	16			
5	70	56	207.2		207.2
6	90	68	516.8		516.8
7	100	48	542.4	720	312.0
8	100	44	616.0	1,320	268.4
9	100	88	1,496.0	3,520	492.8
10	110	80	1,840.0	5,600	456.0
11	120	40	1,220.0	4,000	232.0
12	120	64	2,252.8	7,680	339.2
13	120	32	1,280.0	4,640	153.6
14	120	12	541.2	2,040	52.8
15	110	12	546.0	1,980	44.4
16	110	12	597.6	2,280	38.4
17					
18	110	12	720.0	2,880	25.2
22	100	4	296.0	1,140	4.8
Totals		596	12,672.0	37,800	3,143.6

## SUMMARY.

Age, 22 years. Seedlings.

Volume per acre, 12,672.0 cubic feet, which is equal to 140.8 standard cords, or 187.7 California cords.

Volume per acre, 37,800 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 3,143.6 cubic feet, equal to 34.9 standard cords, or 46.6 California cords.

## WINDERMERE GROVE.

Located between Santa Fe Springs and La Mirada, Los Angeles County.

Species ----- Blue gum. Seedlings.

Age ----- 16 years.

Elevation ----- About 100 feet.

Soil ----- Rather light sandy loam.

Water table ----- About 10 feet deep.

Area of grove ----- About 4 acres, but most of it is cut over. Sample plot was taken in the uncut portion.

Spacing ----- 8 by 8 feet.

Sample plot -----  $\frac{1}{8}$  acre. 54 by 100 feet.

Information in regard to the age of the grove obtained from Mr. R. C. McGill, manager of the Windermere Ranch.

## YIELD.

Diameter Breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2	50	16			
3	60	48			
4	80	32			
5	80	56	252.0		252.0
6	80	64	409.6		409.6
7	100	24	271.2	360	156.0
8	100	56	784.0	1,680	341.6
9	100	72	1,224.0	2,880	403.2
10	110	96	2,208.0	6,720	547.2
11	110	40	2,072.0	3,400	212.0
12	120	24	844.8	2,880	127.2
Totals		528	7,065.6	17,920	2,448.8

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## SUMMARY.

Age, 16 years. Seedlings.

Volume per acre, 7,065.6 cubic feet, which is equal to 78.5 standard cords, or 104.7 California cords.

Volume per acre, 17,920 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,448.8 cubic feet, equal to 27.2 standard cords, or 36.3 California cords.

## FRUITVALE GROVE.

Located on land belonging to the Coast Manufacturing and Supply Company, in Fruitvale, Alameda County.

Species ----- Blue gum. Seedlings.  
 Age ----- 25 years.  
 Elevation ----- About 50 feet.  
 Soil ----- A heavy loamy clay with admixture of adobe.  
 Water table ----- 20 to 25 feet deep.  
 Area of grove ----- About 2 acres; in a long belt, 125 feet wide.  
 Spacing ----- 6 by 6 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 50 by 218 feet. This grove was cultivated the first two years. The trees are unusually straight and symmetrical.

Information in regard to age and management of grove obtained from Mr. Cole, the superintendent of the company.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
3 -----	50	4	-----	-----	-----
4 -----	60	32	-----	-----	-----
5 -----	70	72	266.4	-----	266.4
6 -----	70	116	626.4	-----	626.4
7 -----	80	100	840.0	1,000	550.0
8 -----	90	76	912.0	1,900	425.6
9 -----	100	48	816.0	1,920	268.8
10 -----	110	112	2,576.0	7,840	638.4
11 -----	120	40	1,220.0	4,000	232.0
12 -----	130	60	2,352.0	8,400	348.0
13 -----	140	28	1,414.0	5,740	154.0
14 -----	140	40	2,264.0	9,200	200.0
15 -----	140	24	1,512.0	6,240	108.0
16 -----	140	8	555.2	2,320	32.0
17 -----	140	8	607.2	2,520	28.0
18 -----	150	8	733.6	3,120	25.6
Totals -----	-----	776	16,694.8	54,200	3,903.2

## SUMMARY.

Age, 25 years. Seedlings.

Volume per acre, 16,694.8 cubic feet, which is equal to 185.9 standard cords, or 247.9 California cords.

Volume per acre, 54,200 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 3,903.2 cubic feet, equal to 43.4 standard cords, or 57.8 California cords.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## MEECHAN GROVE — STONY POINT.

Located at Stony Point, Sonoma County.

Species ----- Blue gum. Seedlings.  
 Age ----- 30 years or more.  
 Elevation ----- About 75 feet.  
 Soil ----- Very light, fine grained, sedimentary sand or silt covered with a heavy litter and humus.  
 Water table ----- 10 to 20 feet deep.  
 Area of grove ----- 8 to 10 acres.  
 Spacing ----- 8 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet. The grove was cultivated the first year.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	40	24	-----	-----	-----
3 -----	50	40	-----	-----	-----
4 -----	60	96	-----	-----	-----
5 -----	80	96	432.0	-----	432.0
6 -----	100	80	704.0	-----	704.0
7 -----	110	84	1,075.2	1,680	596.4
8 -----	110	68	1,094.8	2,380	448.8
9 -----	120	56	1,192.8	3,360	375.2
10 -----	120	60	1,548.0	4,800	378.0
11 -----	120	56	1,708.0	5,600	324.8
12 -----	130	44	1,724.8	6,160	255.2
13 -----	130	12	537.6	2,040	63.6
14 -----	-----	-----	-----	-----	-----
15 -----	130	4	225.2	900	17.2
16 -----	130	4	248.8	1,000	15.2
Totals -----	-----	724	10,491.2	27,920	3,610.4

## SUMMARY.

Age, 30 years or more. Seedlings.

Volume per acre, 10,491.2 cubic feet, which is equal to 116.6 standard cords, or 155.4 California cords.

Volume per acre, 27,920 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre 3,610.4 cubic feet, equal to 40.1 standard cords, or 53.5 California cords.

## MEECHAN GROVE — FAUGHT FIELD.

Located at Stony Point, Sonoma County.

Species ----- Blue gum. Seedlings.  
 Age ----- 30 years.  
 Elevation ----- About 200 feet. Located on a fairly steep east slope.  
 Soil ----- A fine grained, loamy sand.  
 Water table ----- 50 feet or more.  
 Area of grove ----- 4 or 5 acres. In the shape of a long belt, 20 rows (150 feet) wide.  
 Spacing ----- 8 by 8 feet.  
 Sample plot -----  $\frac{1}{4}$  acre. 218 by 50 feet. The grove was cultivated the first year.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD FROM EUCALYPTUS

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	40	8	-----	-----	-----
3 -----	60	16	-----	-----	-----
4 -----	80	40	-----	-----	-----
5 -----	80	112	504.0	-----	504.0
6 -----	100	144	1,267.2	-----	1,267.2
7 -----	100	112	1,265.6	1,680	728.0
8 -----	110	68	1,094.8	2,380	448.8
9 -----	110	80	1,552.0	4,000	496.0
10 -----	120	44	1,135.2	3,520	277.2
11 -----	120	48	1,464.0	4,800	278.4
12 -----	120	36	1,267.2	4,320	190.8
13 -----	130	20	896.0	3,400	106.0
14 -----	-----	-----	-----	-----	-----
15 -----	130	4	225.2	900	17.2
Totals -----	-----	732	10,671.2	25,000	4,313.6

## SUMMARY.

Age, 30 years. Seedlings.

Volume per acre, 10,671.2 cubic feet, which is equal to 118.6 standard cords, or 158.1 California cords.

Volume per acre, 25,000 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 4,313.6 cubic feet, equal to 47.9 standard cords, or 63.9 California cords.

## MEECHAN GROVE — SHROPSHIRE FIELD.

Located at Live Oaks, Sonoma County.

Species ----- Blue gum. Seedlings.

Age ----- 30 years.

Elevation ----- About 350 feet; on top of a round hill.

Soil ----- A fine sand, mixed with a small amount of clay, and covered with a coarser sand.

Water table ----- Although the grove is on top of a hill, the water table is not very deep, because of several springs in the vicinity. It is probably not more than 30 or 35 feet deep.

Area of grove ----- About 4 or 5 acres.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	40	8	-----	-----	-----
3 -----	40	16	-----	-----	-----
4 -----	60	56	-----	-----	-----
5 -----	70	40	148.0	-----	148.0
6 -----	80	92	588.8	-----	588.8
7 -----	90	84	814.8	840	504.0
8 -----	90	72	864.0	1,800	403.2
9 -----	90	92	1,343.2	3,220	469.2
10 -----	100	36	727.2	1,980	187.2
11 -----	100	16	379.2	1,120	76.8
12 -----	100	4	109.6	360	17.2
Totals -----	-----	516	4,974.8	9,320	2,394.4

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## SUMMARY.

Age, 30 years. Seedlings.

Volume per acre, 4,974.8 cubic feet, which is equal to 55.3 standard cords, or 73.7 California cords.

Volume per acre, 9,320 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,394.4 cubic feet, equal to 26.6 standard cords, or 35.5 California cords.

## MEECHAN GROVE—ELLIS FIELD.

Located at Live Oaks, Sonoma County.

Species -----Blue gum. Seedlings.

Age -----30 years.

Elevation -----About 200 feet. Sample plot was taken on a gentle southwest slope.

Soil -----Deep, very fine grained, very light sand, with an admixture of clay.

Water table -----Probably 15 to 20 feet.

Area of grove -----The grove is a shelter belt, 7 rows (about 60 feet) wide and one third of a mile long.

Spacing -----10 by 10 feet.

Sample plot ----- $\frac{1}{4}$  acre. 60 by 180 feet. Outside, as well as inside, trees were measured. The grove was cultivated the first year and ploughed over the second year.

Information in regard to age and management of this grove obtained from Mr. F. Meechan.

## YIELD.

Diameter Breast-high.	Average Height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	30	12	-----	-----	-----
3 -----	40	52	-----	-----	-----
4 -----	50	44	-----	-----	-----
5 -----	70	52	192.4	-----	192.4
6 -----	80	48	307.2	-----	307.2
7 -----	80	104	873.6	1,040	572.0
8 -----	90	116	1,392.0	2,900	649.6
9 -----	100	72	1,224.0	2,880	403.2
10 -----	100	84	1,696.8	4,620	436.8
11 -----	110	48	1,286.4	4,080	254.4
12 -----	110	8	247.2	840	38.4
13 -----	100	12	368.4	1,260	46.8
14 -----	90	12	372.0	1,140	31.2
15 -----	90	12	422.4	1,210	28.8
16 -----	90	8	319.2	1,040	18.4
Totals -----	-----	684	8,701.6	21,010	-----

## SUMMARY.

Age, 30 years. Seedlings.

Volume per acre, 8,701.6 cubic feet, which is equal to 96.7 standard cords, or 128.9 California cords.

Volume per acre, 21,010 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,979.2 cubic feet, equal to 33.1 standard cords, or 44.1 California cords.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD FROM EUCALYPTUS

## McDONALD GROVE.

Located about one mile from Railroad Station, El Cajon, San Diego County.

Species ----- Blue gum. Seedlings.

Age ----- 30 years.

Soil ----- A fine grained, rather loose, loamy sand.

Water table ----- 12 to 15 feet.

Area of grove ----- This grove has an area of about 5 acres and is in the form of a shelter belt about 200 feet wide, forming three sides of a rectangle. A part of it has been cut over. The sample plots were taken in the uncut portion.

Spacing ----- 10 by 10 feet.

Sample plot ----- Two sample plots.  $\frac{1}{4}$  acre each.

Information in regard to age of the grove obtained from Mr. Dodson of El Cajon.

## YIELD.

Diameter Breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
3 -----	30	8			
4 -----	40	12			
5 -----	50	14	37.8		37.8
6 -----	60	18	79.2		79.2
7 -----	70	26	187.2	260	127.4
8 -----	80	28	294.0	560	140.0
9 -----	90	122	1,781.2	4,270	622.2
10 -----	90	34	591.6	1,530	159.8
11 -----	100	22	521.4	1,540	105.6
12 -----	100	4	109.6	360	17.2
13 -----	110	10	354.0	1,250	44.0
14 -----					
15 -----	120	2	100.4	390	7.8
Totals -----		300	4,056.4	10,160	1,341.0

## SUMMARY.

Age, 30 years. Seedlings.

Volume per acre, 4,056.4 cubic feet, which is equal to 45.1 standard cords, or 60.1 California cords.

Volume per acre, 10,160 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,341.0 cubic feet, equal to 14.9 standard cords, or 19.9 California cords.

## THEREFALL GROVE.

Located about three miles from Railroad Station, Newark, Alameda County.

Species ----- Blue gum. Seedlings.

Age ----- 32 years.

Elevation ----- About 50 feet.

Soil ----- Adobe loam.

Water table ----- 14 to 15 feet deep.

Area of grove ----- 7 acres.

Spacing ----- 6 by 6 feet.

Sample plot -----  $\frac{1}{4}$  acre. 109 by 100 feet.

Information in regard to age of the grove obtained from the manager of the Pacific Land Investment Co., the present owners.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2	30	4			
3	40	16			
4	50	36			
5	70	40	148.0		148.0
6	70	36	194.4		194.4
7	90	56	543.2	560	336.0
8	110	88	1,416.8	3,080	580.8
9	120	40	852.0	2,400	268.0
10	130	44	1,245.2	4,180	299.2
11	130	20	674.0	2,300	126.0
12	140	52	2,267.2	8,580	327.6
13	150	16	913.6	4,000	96.0
14	150	12	757.2	3,300	62.4
15	150	36	2,530.8	10,980	180.0
16	150	8	616.8	2,680	33.6
17	160	16	1,476.8	6,480	64.0
18	160	12	1,221.6	5,220	42.0
19	160	4	441.2	1,860	12.0
20	170	4	537.6	2,200	11.6
Totals		540	15,836.4	57,820	2,781.6

## SUMMARY.

Age, 32 years. Seedlings.

Volume per acre, 15,836.4 cubic feet, which is equal to 176.0 standard cords, or 234.6 California cords.

Volume per acre, 57,820 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,781.6 cubic feet, equal to 30.9 standard cords, or 41.2 California cords.

## GLASS GROVE.

Located on Central avenue, between Watts and Compton, Los Angeles County.

Species ----- Blue gum. Sprouts.

Age ----- 8 years. Planted originally about 16 years ago.

Elevation ----- About 100 feet.

Soil ----- Stiff, sandy loam.

Water table ----- 15 to 25 feet deep.

Area of grove ----- 4 acres.

Spacing ----- 8 by 8 feet.

Sample plot -----  $\frac{1}{4}$  acre. 181 by 60 feet.

Information obtained from Mr. Glass, the present owner of the grove.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2	40	156			
3	40	256			
4	60	172			
5	60	140	448.0		448.0
6	80	92	588.8		588.8
7	80	84	705.6	840	462.0
8	80	92	966.0	1,840	460.0
9	90	48	700.8	1,680	244.8
10	90	4	69.6	180	18.8
11	90	20	410.0	1,200	86.0
Totals		1,064	3,888.8	5,740	2,308.4

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## SUMMARY.

Age, 8 years. Sprouts.

Volume per acre, 3,888.8 cubic feet, which is equal to 43.2 standard cords, or 57.6 California cords.

Volume per acre, 5,740 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,308.4 cubic feet, equal to 25.6 standard cords, or 34.2 California cords.

## JEWETT GROVE.

Located near Elmira, Solano County.

Species ----- Blue gum. Seedlings.

Age ----- About 35 years.

Elevation ----- About 75 feet.

Soil ----- Very fertile clayey loam.

Water table ----- 25 to 30 feet deep.

Area of grove ----- Originally about 5 acres, but most of it is cut over.

Spacing ----- 10 by 10 feet.

Sample plot -----  $\frac{1}{4}$  acre. 180 by 60 feet. About ten years ago 200 trees were cut in this grove. The sample plot was located so as to exclude the cut area.

Information in regard to age of the grove obtained from Mrs. Jewett, the present owner. When the Jewetts came to this place, twenty-five years ago, the trees were already of good size. Mr. McCrory, an old settler in the vicinity, thinks that the trees were set out about thirty-five years ago.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
4 -----	50	16	-----	-----	-----
5 -----	50	4	10.8	-----	10.8
6 -----	60	12	52.8	-----	52.8
7 -----	90	40	388.0	400	240.0
8 -----	90	28	336.0	700	156.8
9 -----	100	32	544.0	1,280	179.2
10 -----	100	12	242.4	660	62.4
11 -----	100	32	758.4	2,240	153.6
12 -----	110	16	494.4	1,680	76.8
13 -----	110	40	1,416.0	5,000	176.0
14 -----	110	40	1,600.0	5,800	160.0
15 -----	120	20	1,004.0	3,900	78.0
1 -----	120	16	888.0	3,520	56.0
1 -----	120	8	488.8	1,960	24.0
1 -----	120	12	801.6	3,240	28.8
1 -----	120	8	580.0	2,320	15.2
20 -----	-----	-----	-----	-----	-----
21 -----	130	4	372.4	1,580	5.2
22 -----	130	4	399.6	1,740	5.2
Totals -----	-----	344	10,377.2	36,020	1,480.8

## SUMMARY.

Age, about 35 years. Seedlings.

Volume per acre, 10,377.2 cubic feet, which is equal to 115.3 standard cords, or 153.7 California cords.

Volume per acre, 36,020 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,480.8 cubic feet, equal to 16.5 standard cords, or 21.9 California cords.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## WEBB GROVE.

Located between San Lorenzo and Hayward, Alameda County, R. F. D. No. 8 from Hayward.

Species ----- Blue gum. Seedlings.

Age ----- 36 years.

Elevation ----- About 200 feet.

Soil ----- Hard adobe clay.

Water table ----- About 40 feet deep.

Area of grove ----- About 5 acres.

Spacing ----- Originally 8 by 8 feet. Thinned out when the grove was about 10 years old, by taking out alternate rows. Present spacing 16 by 16 feet.

Sample plot -----  $\frac{1}{4}$  acre. 66 by 165 feet.

Information in regard to age and management of this grove obtained from Mr. E. O. Webb, the owner.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
6 -----	70	8	43.2	-----	43.2
7 -----	70	8	71.2	120	36.0
8 -----	80	12	152.4	360	55.2
9 -----	100	20	404.0	1,100	104.0
10 -----	100	16	379.2	1,120	76.8
11 -----	110	32	988.8	3,360	153.6
12 -----	110	20	708.0	2,500	88.0
13 -----	110	16	640.0	2,320	64.0
14 -----	110	24	1,092.0	3,960	88.8
15 -----	110	8	439.2	1,720	22.4
16 -----	110	4	260.8	1,040	6.0
17 -----	110	4	260.8	1,040	6.0
18 -----	110	4	260.8	1,040	6.0
19 -----	110	4	260.8	1,040	6.0
Totals -----		168	5,178.8	17,600	738.0

## SUMMARY.

Age, 36 years. Seedlings.

Volume per acre, 5,178.8 cubic feet, which is equal to 57.5 standard cords, or 76.7 California cords.

Volume per acre, 17,600 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 738.0 cubic feet, equal to 8.2 standard cords, or 10.9 California cords.

## LINDA VISTA GROVE.

Located about a mile and a quarter south of Mission San Jose, Alameda County.

Species ----- Blue gum. Seedlings.

Age ----- 40 years.

Elevation ----- About 500 feet. Located on a gentle, west slope.

Soil ----- A hard clay loam, with admixture of adobe.

Water table ----- Quite deep, but there are a number of springs on the area.

Area of grove ----- About 3 acres.

Spacing ----- 8 by 8 feet.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to age of the grove obtained from the manager of the ranch.

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## YIELD FROM EUCALYPTUS

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
3 -----	40	16	-----	-----	-----
4 -----	60	24	-----	-----	-----
5 -----	70	52	192.4	-----	192.4
6 -----	80	68	435.2	-----	435.2
7 -----	100	68	768.4	1,020	442.0
8 -----	110	84	1,352.4	2,940	554.4
9 -----	120	68	1,448.4	4,080	455.6
10 -----	130	56	1,584.8	5,320	380.8
11 -----	130	28	943.6	3,220	176.4
12 -----	130	40	1,568.0	5,600	232.0
13 -----	140	28	1,414.0	5,740	154.0
14 -----	140	32	1,811.2	7,360	160.0
15 -----	140	20	1,260.0	5,200	90.0
16 -----	150	12	925.2	4,020	50.4
17 -----	150	4	335.6	1,440	15.2
18 -----	150	12	1,100.4	4,680	38.4
Totals -----	-----	612	15,139.6	50,620	3,376.8

## SUMMARY.

Age, 30 years and over. Seedlings.

Volume per acre, 15,139.6 cubic feet, which is equal to 168.2 standard cords, or 224.3 California cords.

Volume per acre, 50,620 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 3,376.8 cubic feet, equal to 37.5 standard cords, or 50.0 California cords.

## MONTAGUE GROVE.

Located on Central avenue, between Watts and Compton, Los Angeles County.

Species ----- Blue gum. Sprouts.

Age ----- 8 or 9 years.

Elevation ----- About 100 feet.

Soil ----- Stiff, heavy, loamy sand.

Water table ----- 12 feet deep.

Spacing ----- 8 by 10 feet.

Sample plot ----- ¼ acre. 218 by 50 feet.

Information in regard to age of the grove obtained from Mr. Brinkerhoff and Mr. Breckenridge, who live within half a mile of the plantation.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic feet.
2 -----	50	144	-----	-----	-----
3 -----	60	172	-----	-----	-----
4 -----	70	160	-----	-----	-----
5 -----	70	84	310.8	-----	310.8
6 -----	80	148	947.2	-----	947.2
7 -----	80	100	840.0	1,000	550.0
8 -----	80	76	798.0	1,520	380.0
9 -----	80	28	355.6	840	128.8
10 -----	90	16	278.4	720	75.2
Totals -----	-----	928	3,530.0	4,080	2,392.0

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

## SUMMARY.

Age, 8 or 9 years. Sprouts.

Volume per acre, 3,530 cubic feet, which is equal to 39.2 standard cords, or 52.3 California cords.

Volume per acre, 4,080 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,392.0 cubic feet, equal to 26.6 standard cords, or 35.5 California cords.

## THAXTER GROVE.

Located about a quarter of a mile west of Nadeau, on the Pacific Electric car line from Los Angeles, Los Angeles County.

Species ----- Blue gum. Sprouts.

Age ----- 11 to 13 years. Planted originally twenty to twenty-five years ago.

Elevation ----- About 150 feet.

Soil ----- Light loamy sand.

Water table ----- Originally 16 feet deep, but in the last few years about 30 feet deep.

Area of grove ----- 8 to 10 acres.

Spacing ----- 8 by 8 feet.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

Information in regard to age of the grove and time of cutting obtained from Mrs. Annette Thaxter, the present owner.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
Inches.	Feet.	Number.	Cubic feet.	Board feet.	Cubic Feet.
2 -----	50	208	-----	-----	-----
3 -----	50	272	-----	-----	-----
4 -----	60	232	-----	-----	-----
5 -----	60	148	473.6	-----	473.6
6 -----	70	100	540.0	-----	540.0
7 -----	70	32	230.4	320	156.8
8 -----	80	16	168.0	320	80.0
9 -----	80	4	50.8	120	18.4
10 -----	80	12	180.0	480	49.2
Totals -----	-----	1,024	1,642.8	1,240	1,318.0

## SUMMARY.

Age, 11 to 13 years. Sprouts.

Volume per acre, 1,642.8 cubic feet, which is equal to 18.2 standard cords, or 24.3 California cords.

Volume per acre, 1,240 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 1,318.0 cubic feet, equal to 14.6 standard cords, or 19.5 California cords.

## THAXTER GROVE.

Located near Nadeau Station, on the Pacific Electric car line from Los Angeles, Los Angeles County.

Species ----- Blue gum. Sprouts.

Age ----- 13 to 20 years. Planted originally about thirty years ago. Cutting in this grove extended from 1890 to the winter of 1897.

Elevation ----- About 150 feet.

Soil ----- Very light loamy sand.

Water table ----- 30 to 35 feet deep.

Area of grove ----- About 5 acres.

Spacing ----- Originally 10 by 10 feet.

Sample plot -----  $\frac{1}{4}$  acre. 100 by 109 feet.

\*The volume given in board feet is *not in addition* to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

Information in regard to age of the grove and time of cutting obtained from Mr. Bell, the former owner, and Mrs. Annette Thaxter, the present owner.

## YIELD.

Diameter breast-high.	Average height.	Trees per acre.	Volume per acre.	Volume per acre.	Volume of tops per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Cubic feet.</i>	<i>Board feet.</i>	<i>Cubic feet.</i>
2 -----	40	32	-----	-----	-----
3 -----	60	84	-----	-----	-----
4 -----	60	124	-----	-----	-----
5 -----	90	96	537.6	-----	537.6
6 -----	90	68	516.8	-----	516.8
7 -----	90	64	620.8	640	384.0
8 -----	110	48	772.8	1,680	316.8
9 -----	120	32	681.6	1,920	214.4
10 -----	120	32	825.6	2,560	201.6
11 -----	130	16	539.2	1,840	100.8
12 -----	130	12	470.4	1,680	69.6
Totals -----	-----	608	4,964.8	10,320	2,341.6

## SUMMARY.

Age, 13 to 20 years. Sprouts.

Volume per acre, 4,964.8 cubic feet, which is equal to 55.2 standard cords, or 73.5 California cords.

Volume per acre, 10,320 board feet.\*

Volume of merchantable tops, including the trees too small to scale, per acre, 2,341.6 cubic feet, equal to 26.1 standard cords, or 34.7 California cords.

## YIELD FROM EUCALYPTUS OTHER THAN BLUE GUM.

Although there are seventy-five or more different species of eucalyptus growing in California, very few of them outside of blue gum are found in grove form, the trees usually occurring either singly, in narrow belts, or in small patches. Old plantations of even an acre in extent are extremely rare. It is, therefore, impossible to give the yield from planted eucalyptus other than blue gum, except to make the general statement that, although inferior to many of the eucalypts in the quality of its wood and its durability in contact with the soil, blue gum is by far the most rapid growing of the eucalypts. This lack of definite data is very unfortunate in view of the extensive planting of the red, gray, and sugar gums that has taken place within the last two or three years. The few eucalyptus groves more than five or six years of age, outside of blue gum, which are now found in the State show without exception slow growth and poor form and development. The trees are either crooked and scrubby, or else spindling and leaning, and few of the trees growing in grove form will make desirable timber. Whether this poor growth and form is a result of the inability of the trees to grow in close stands, or whether it is due to some other factor, it is impossible to state; but it may be of interest

\*The volume given in board feet is not in addition to the volume stated in cubic feet and in cords, but is simply another way of expressing the same total.

to know that the same poor development of the eucalypts was found in Hawaii, though there the blue gum (*E. globulus*), the red mahogany (*E. resinifera*), and the swamp mahogany (*E. robusta*) make desirable form development when grown in close plantations. Both in California and in Hawaii many other species besides blue gum make excellent growth if planted as single trees or in small patches.

The Dwight Whiting grove at El Toro, in San Diego County, about five years old, composed of a mixture of several species; the Vowkovich Brothers' grove near Hanford, in Kings County, about six years old, composed mostly of red, gray, and blue gums; the San Mateo grove of ironbark (*E. sideroxylon*); the Clift grove of sugar gum on Point Loma, in San Diego County, all show poor development and slow growth. Following are tables showing the stand in two of the oldest groves of eucalyptus other than blue gum:

## CARPENTER GROVE.

**Located near Santa del Rosa, San Bernardino County.**

Species	Sugar gum ( <i>E. corynocalyx</i> ). Seedlings.
Age	19 years.
Elevation	About 1,200 feet. Slope moderate, south exposure.
Soil	A coarse grained loamy sand mixed with adobe; mostly of decomposed granite.
Water table	Probably over 100 feet.
Area of grove	2 acres.
Spacing	8 by 8 feet.
Sample plot	$\frac{1}{4}$ acre. 100 by 100 feet.

Information in regard to the age of the grove obtained from the owner of the grove, who consulted an old journal kept when the plantation was started.

**YIELD.**

Diameter breast-high.	Average height.	Trees per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>
2 -----	20	44
3 -----	30	148
4 -----	40	172
5 -----	45	88
6 -----	45	44
7 -----	50	16
Total -----		512

**DAVIS GROVE.**

**Located near Lankershim, Los Angeles County.**

Species -----	Irregular mixture of Blue gum ( <i>E. globulus</i> ) and Red gum ( <i>E. rostrata</i> ).	
Age -----	8 years. Sprouts. Planted originally in 1894, and the entire area cut over in 1902.	
Elevation -----	About 800 feet.	
Soil -----	Light sandy loam.	
Water table -----	15 feet.	
Area of grove -----	15 acres.	
Spacing -----	16 by 4.	Trees 4 feet apart in rows, and rows 16 feet apart.
Sample plot -----	¼ acre.	100 by 100 feet.

## YIELD FROM EUCALYPTUS.

Information in regard to the age of the grove and time of cutting obtained from Mr. E. B. Mitchell, who helped plant the trees and who also helped in cutting the grove.

## YIELD.

E. ROSTRATA.			E. GLOBULUS.		
Diameter breast-high.	Average height.	Trees per acre.	Diameter breast-high.	Average height.	Trees per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>
2 -----	20	184	2 -----	30	20
3 -----	40	340	3 -----	50	36
4 -----	40	264	4 -----	60	12
5 -----	40	76	5 -----	60	4
6 -----	50	20	6 -----		
Total -----		884	Total -----		72

## DAVIS GROVE.

Age-----3 years. Sprouts.

The same grove as above. The sample plot taken in an area where the trees were cut off a second time.

## YIELD.

E. ROSTRATA.			E. GLOBULUS.		
Diameter breast-high.	Average height.	Trees per acre.	Diameter breast-high.	Average height.	Trees per acre.
<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Number.</i>
2 -----	20	804	2 -----	25	64
3 -----	30	264	3 -----	40	52
4 -----	35	4	4 -----	45	4
Total -----		1,072	Total -----		120

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